B. Theoretical and Empirical Background

As argued in the introduction, international diversification (a small home bias) and similar portfolios could have an impact on business cycle convergence. The proceeding in the next sections can be described as follows:

Firstly, it is shown why converged business cycles are important for a monetary union such as the EMU. A special focus is laid upon financial integration because of its major role on investment possibilities and business cycle convergence.

The second question is: Can financial wealth alone have an influence on business cycle convergence? The answer is probably “no” if investment strategies do not converge and lead to similar income effects. Consider e.g. an investor who puts money on current accounts as compared to an investor who buys bonds. Probably, the income effect is different. A plausible transmission channel would run from financial wealth to consumption, which has an impact on portfolios and the business cycle. This first linkage is described in the second step: the consumption-wealth-linkage. If portfolios are similar, the consumption should be also similar, at least out of financial wealth.

The third and major part of Section B provides the theoretical foundation of modern portfolio-theory as a basis for similar portfolios, discussing the IAPM and the home bias phenomenon. Whether or not the IAPM is a plausible starting point is investigated in this part as well.

2. Business Cycle Convergence and Consumption

2.1 Optimal Currency Area Criteria

As mentioned above, synchronised business cycles are important for monetary unions because the degree of synchronisation defines the costs of giving up the power of interest rate setting induced by joining a monetary union. However, which factors contribute to business cycle convergence?

The concept of the optimal currency area criteria, founded by the works of Mundell (1961), McKinnon (1963), and Kenen (1969), provide a framework for the analysis. Basically, theory says that joining a monetary union is advantageous for a country if the benefits of being a member (lower transaction costs...
due to exchange rate certainty) outweigh the costs (losing the exchange rate and monetary policy as a stabilizer). Both the amount of benefit and cost are dependent on the degree of economic integration between a single country and the other members of the monetary union, e.g. a country that trades much with the other member countries gains more from the cessation of exchange rate uncertainty. Costs arise if an asymmetric shock hits a member country. In this case, neither monetary policy nor the exchange rate can cushion the effect. In well-integrated countries, the adjustment process after a negative asymmetric shock will be less costly because price reductions will attract more demand from other countries and factor mobility can act as compensation.

The closer the business cycles of member countries are, the more they benefit and the less costly adjustments are to asymmetric shocks because monetary policy can react. The optimal currency area literature therefore concentrates on discussing the effects of shocks and the functioning of adjustment channels in the case of asymmetric shocks. A common reaction to shocks and the ability to absorb asymmetric shocks are key factors for a synchronisation of business cycles.

The optimal currency area theory examines the following factors:

Economic integration of countries is supported by the degree of openness – a country that trades much has closer links to the other countries and should therefore be influenced by the state of the economy of other countries. One may note that Frankel and Rose (1998) argue, that trade links can lead to converged cycles, meaning that converged cycles are not necessarily a precondition for joining a monetary union but endogenous. They argue that the positive linkages of trade outweigh the negative implications of trade-induced specialisation.

An adjustment channel is factor mobility, for example migration. Workers who migrate keep their income stable and do not suffer from the shock (Mundell, 1961). Another adjustment channel is fiscal transfers. In a monetary union they act as an ex post adjustment to dampen the impacts of a shock (Kenen, 1969).

In newer literature the willingness of politics to implement necessary reforms to achieve adaptations to economic situations is named as an adjustment instrument to optimize monetary unions (Heinemann, 1998). This argument is a very prominent one in the current 2010 euro area crisis induced by the possible breakdown of the member state Greece.

An important aspect of the optimal currency area is the reaction towards shocks. Asymmetric shocks are less probable the more similar economic structures are. For example, if industrial sectors are similar in two countries, it is probable that an idiosyncratic shock in one country infects the other country via trade linkages. However, this is dependent on the kind of trade linkages. If intra-industry trade prevails, an infection and for this reason a similar shock reaction
would occur. A dominating inter-industry trade would cause the opposite effect (Imbs, 2004).

Different financial structures in countries might oppose the idea of a common monetary policy because they lead to different effects of a common interest rate (Belke, Eppendorfer, and Heine, 2002). E.g. the UK with its mostly variable mortgage rates should react in its consumption a good deal more sensitive to interest rate changes than Germany with its mostly fixed rate financing system. As a consequence business cycles might de-synchronised through different structures. As fiscal policy does not seem to compensate these differences, market solutions such as country risk premiums are discussed, leading in fact to different interest rates in different member countries (Hughes Hallet and Piscitelli, 2002). Therefore a similarity of financial structures can be a condition for joining countries.

Another channel for cushioning shocks is financial market integration, having in turn influence on industry specialisation. Due to its importance for the dissertation, the next section pays special attention to this topic.

### 2.2 Financial Market Integration and Business Cycle Convergence

Complete financial market integration has the result that the same asset has the same return in two countries. The instruments for measuring integration mentioned in the literature range from cross-border capital mobility and international capital flows to shareholder rights (for an overview see Imbs, 2004). International portfolio diversification, as suggested by portfolio theory, preconditions the possibility of free cross-border capital flows. This precondition is given within the EMU and for most industrialized countries in the world, though the remark should be included here that financial markets in EMU are not completely, but highly and growingly, integrated according to several empirical studies (e.g. Fratzscher, 2002, for stock markets). In a monetary union market, channels such as trade in assets or credit channels have an important function to absorb shocks. Among different market channels, the channel of diversified property holding proved to be one of the most important contributions to risk sharing (i.e. shock absorption) in the EU (Mélitz and Zumer, 2000).

Financial market integration and its effect on business cycle integration are discussed ambiguously in the literature. One line of arguments deals with the affects of financial market integration on business cycles via specialisation, while the other line discusses a direct impact of financial market integration on the real economy. The basic chain of arguments runs as follows:

First, financial integration enables countries to specialize because resources are allocated according to the best possible utilisation. If countries specialise,
they are encountered by different economic influences, and asymmetric shocks may hit these countries. Business cycles tend to diverge.

Second, financial markets do have a direct impact on business cycles. The influencing factors are investment strategies of companies that amplify cycles via shock transmissions, e.g. through herding effects. Market integration leads to synchronisation of cycles because of the similar impact of finance on it.

These two main lines have been discussed in the literature so far. The main line of argument followed in this dissertation runs as follows:

Third, financial integration leads to more similar portfolios because it is plausible to diversify risks internationally. Consumption converges because of the harmonisation of financial income. As consumption is the major part of GDP, consumption correlation leads to business cycle correlation.

This third line contravenes the first line of arguments. In the first line, the negative role of specialisation with concern to asymmetric shocks dominates; whereas, the third line stresses the positive effects of income similarity on consumption. The consumption argument will be adopted throughout the dissertation.

To start with, a literature review of the first two arguments is provided:

The properties of financial markets influence industrial specialisation, and specialisation does have an impact on business cycles. A result of specialisation is that sector-specific shocks have a similar impact on countries with similar industry structures, e.g. Ricardian models would suggest that countries produce whatever their comparative advantage is. With financial market integration, this specialisation is easier because specialisation does not necessarily need to be fulfilled by trade, but could be compensated by assets (capital allocation function). Specialisation leads to different reactions in the case of asymmetric shocks, leading to a dispersion of cycles.

The background for this first line of arguments is laid by empirical investigations of the question as to whether or not financial integration leads to industry specialisation, e.g. Svaleryd and Vlachos (2005) concluded for OECD-countries that a well-developed financial sector contributes to growth and facilitates specialisation although the authors assume financial markets to be quite immobile to national borders. Their main argument is that only a factor that is fixed within national borders can induce a comparative advantage according to the Hecksher-Ohlin model. Still, this is no counter-argument to apply the main line of arguments that a well functioning financial market can induce specialisation. This is indeed a main argument of the international risk sharing literature: Kalemli-Ozcan, Sørensen, and Yoshia (2005) find out empirically that risk sharing has increased in the decade of the 1990s within the EU. Risk sharing means that
portfolios are diversified in a way, that national income is held constant. The authors attribute this observation to higher financial integration, as expressed by higher international asset holdings. Although the same time specialisation in industries rose, GDP did not vary as much as expected because the nature of shocks was not asymmetric in the time range of the analysis.

The linkage from specialisation to business cycle correlation is conducted by Belke and Heine (2006, 2007). They examine the influence regional industrial specialisation has on the respective regional business cycle measured by employment cycles. The results indicate that cycle synchronisation is indeed influenced, but the direction depends on the kind of industry pattern. Countries that specialised in the same industries will show closer cycles; on the other hand, inter-industry specialisation induces a decreased convergence.

The second line of argument deals with a more direct impact of financial markets on GDP. Authors advocating a (direct) negative impact of international asset trade on business cycle convergence are Heathcote and Perri (2004). They argue that in times of a positive country shock, a domestic firm would be willing to invest (at home) with the consequence of fewer dividends for their domestic shareholders. A domestic firm calculates that the domestic demand is not cut by this step because income out of foreign dividends has to some extend a compensating effect if diversified portfolio holdings are assumed. Therefore, in times of high productivity, companies are willing to invest – strengthening the positive trend in the domestic country; and in times of less productivity, companies will not invest – strengthening the negative trend. All in all, this leads to the conclusion that more financial integration leads to less business cycle integration. The authors depart from the precondition that shocks became more and more country-specific since the 1970s, making international diversification more attractive. Therefore a country, particularly its investors, receives money whichever state its economy is, making its business cycle more idiosyncratic.

In a two-country model, Pierdzioch (2004) provides an ambiguous picture and investigates how asymmetric shocks in a monetary union are propagated with the background of increasing financial market integration. The model compares the transmission of shocks in the case of a market exclusively for risk free bonds against the case of a complete market of state-contingent claims. State-contingent claims mean that the payout depends on the state of a certain economy. In theory, this leads to perfect international risk sharing with equal marginal utility of households and also therefore to equal consumptions in two countries. The intuition behind this is that households can hold perfectly diversified portfolios, and therefore consumption does not change if shocks are negatively correlated in the member countries of the monetary union. The author concludes that how output reacts depends on the kind of asymmetric shock. In case of a productivity shock,
business cycle volatility is increased because consumption is assumed to remain on the same level with state-contingent bonds. In this case, households need to adjust labour supply and terms of trade to adjust to good market equilibrium. A permanent government spending shock does not affect output since the terms of trade are not changed. Shock absorption through financial market integration and international asset trade has therefore two sides according to Pierdzioch (2004).

The negative view is doubted by the majority of authors. Highly integrated markets include the possibility to withdraw capital quickly, e.g. Calvo and Mendoza (2000) show that financial market integration leads to more herding and contagion effects defined as “portfolio allocations” that are not necessarily justified by changes in fundamentals, but are more or less due to rumours and arbitrary market moves. The basic assumption of the model is that information costs decrease with a growing globalization. Portfolios become more sensitive for changes in returns, and as information becomes less costly, it becomes more likely that following the herd is a good decision for optimizing the portfolio. It is expected that the (acting) market participants are well informed and a country specific premium incurs less worth. Another factor in theory is that if marginal information costs exceed the gain, it is reasonable for portfolio managers to imitate market portfolios. If contagion becomes more probable with a growing market, money is likely to be withdrawn simultaneously from several countries, leaving these countries with a lack of capital and a possible recession as a consequence. Several authors investigated in this topic, see Decamps and Lovo (2006) among others, Hey and Morone (2004), and the initial work of Baneerje (2004). The same time other countries profit from herding because of the capital inflows withdrawn from other countries. Consequently herding might lead to a de-synchronizing of cycles. However, the desynchronizing will only take place between the winning country group and the losing country group. Within these, group cycles are rather synchronized.

Put together, theory provides arguments in favour and against a positive impact on financial integration on business cycle convergence. Negative implications are expected from its effects on specialisation; the direct links are ambiguous.

Imbs (2004) puts the arguments above together and estimates their different effects in a set of simultaneous equations, using data sets of 24 countries. He came to the conclusion that although financially integrated countries tend to be more specialised, having a negative effect on synchronisation, the direct effects of integration far outweigh the negative effects. All in all, this leads to a better synchronization of financially well-integrated countries.

The same conclusion was derived in another empirical study. This study covers the European countries and indicates positive effects of financial market integration on GDP correlation (Schiavo, 2008). The arguments brought forward are the efficient allocation of resources, risk sharing, and the business cycle cor-
relation induced by closer trade linkages in a monetary union. In a system of simultaneous equations measuring output correlation, the determinants of synchronisation are financial integration, trade, and industrial specialisation. The hypothesis of a positive correlation between financial integration and business cycle correlation is confirmed in this study.

What is the linkage to private portfolios in Europe? As concluded above, financial market integration is advantageous for business cycle convergence. So far the scientific world has not discussed that international portfolio diversification – or to be more precise similar financial income structures – might have a positive and direct impact on business cycle convergence. The dissertation investigates a channel for the important optimal currency area criterion of business cycle convergence that is new to the literature so far.

2.3 Consumption

2.3.1 Consumption Function

Consumption makes up a large part of GDP, is influenced by several factors, and explained by different theory lines. Generally speaking, consumption is the value of all goods and services used in a certain period (Eurostat, 2009). Consumption can be allocated either to government or to private households. Throughout the dissertation, the term is used for private consumption.

The basic model of consumption goes back to Keynes. According to the Keynesian model of consumption (see macroeconomic textbooks, e.g. Sørensen, P.B. and Whitta-Jacobsen, 2005, p. 466 et seqq. or Felderer and Homburg, 2005, p. 104 et seq.), consumption is mainly dependent on disposable income although the propensity to consume declines with an increasing income. Put in other words: a greater part of income is saved instead of consumed if income rises. Two counter-arguments to this position are usually brought up: first, it is questionable if only current income influences current consumption; second, empirical studies show that over a longer time range the proportion of consumption to income stays quite stable in countries which became richer, e.g. the US. It was expected that with rising income, consumption becomes smaller. The first objection is encountered by the hypothesis that a consumer usually tries to maximize life-time utility, which is constrained by her or his budget. It is assumed that consumption in an earlier period is valued higher as consumption in a later period, but different weights are preferred if different consumers are considered (Neokeynesian model). The idea that households take income expectations into account is confirmed for the US in a recent study by Pounder (2009). She uses survey data to estimate
expected future income and finds out that higher expected future income results in higher consumption today under the preconditions that future income is certain, or that the households are not risk averse. This is important for the dissertation with regard to the focus on equity and bonds since these instruments are often used in pension plans. However, although they might not bring current income, these instruments bring future income which again should bring stable returns in order to have an impact on current consumption.

The second objection, the stable proportion of consumption and income, is analysed in the following section dealing with the consumption-wealth linkage.

In another theory line explaining consumption – the neoclassical theory – the allocation of income to consumption and savings is determined by the budget constraint and by the interest rate, with the thought that an interest rate increase would be an incentive to save more. Consumption is therefore only dependent on the level of interest rate – a thought that cannot be empirically confirmed.

Keynes himself mentions around 24 factors that possibly affect the consumption function (Felderer and Homburg, 2005, p.104) although without doubt a major fraction of consumption is disposable income – both earned income and income out of financial wealth.

The topic of consumption should be understood in the context of this dissertation. In summary, first of all, consumption influences GDP, and via GDP consumption influences business cycles. Business cycle convergence would mean that the inflation targeting is easier for the ECB because monetary policy would have more similar impacts if it is conducted in similar business cycle stadiums of different countries.

Some empirical research investigated the direct relationship between consumption and the transmission of monetary policy. Barrell, Byrne, and Dury (2003) had a closer look at the euro area and choose a model which regards the euro countries as homogenous. This is conducted in the sense of an experiment to see which monetary rule the ECB should choose in a certain situation. Depending on the goals of policy makers (inflation target, output stability and price stability), different policy rules make sense. The two-pillar strategy combines inflation targeting with a nominal target (setting interest rates according to deviations from a chosen nominal aggregate like the GDP). The combinations of goals with inflation targeting as the set goal of the ECB would always lead to a preference of the nominal target compared to the two-pillar strategy, which would probably make monetary policy simpler.
2.3.2 Consumption-wealth-linkage

The aim of the dissertation is to show that portfolios have an influence on business cycles via consumption. Therefore, the next issue that needs to be considered is the question, “Whether or not and how much the consumption out of financial wealth contributes to the overall consumption, the so-called consumption-wealth linkage.” The consumption wealth linkage is defined as the marginal influence of a change in wealth on consumption.

Intuitionally, wealth should clearly have an influence on consumption. The basic idea is that higher returns out of wealth stimulate private consumption because disposable income is increased. However, if in a very extreme case nobody would ever touch financial resources, portfolios could be identical but would have no effect on consumption and synchronisation. The income source out of financial wealth is closely related to investment and wealth. The term investment is used in this dissertation in the sense of financial portfolio investment, not in the sense of manufacturing equipment or other investment for production purposes.

Wealth is part of the consumption function according to the life cycle hypothesis (Ando and Modigliani, 1963). This hypothesis assumes that planned consumption is a function of wealth; whereas, wealth consists of human wealth, financial wealth, and tangible wealth. In general, compared to other components, a higher impact of financial wealth on consumption is expected due to its more liquid characteristic. Yet in recent years, housing wealth has attached a growing attention in this context due to better possibilities to borrow against housing wealth.

Ludwig and Slok (2002, p. 6) list the driving forces of the theoretical motivation for the connection between financial (stock market) wealth and consumption:

- Realised and unrealised wealth effects (realised in the sense of selling assets at a higher price, unrealised in the sense of having gains just “in the books”; the latter one leads to higher income expectations);
- Liquidity constraints effect (it is easier to borrow against a higher value of the portfolio) and
- Value-effects for the holders of stock options.

A more general relationship, i.e. relative income differences (out of total income) do affect business cycle synchronisation, has been approved in the literature (Imbs, 1999) though the explanation for this result comes from the conclusion that similar income levels (industrial countries vs. emerging markets) usually have the same industrial structures as a background, leading back to the topic of inter- and intra-industry trade that has been discussed above.
Numerous studies concerning this topic exist (for an overview see Poterba (2000) or Barrell and Davis (2004)). Following Poterba (2000), there are several issues concerning the transmission from financial wealth to consumption that have to be considered:

- Composition of household wealth: proportion of financial wealth to total wealth. The bigger the financial wealth proportion is the higher should be its effect on consumption.
- Distribution of financial wealth: how is financial wealth concentrated in the population? The more concentrated wealth is, the more a smaller fraction of the population (in this case the wealthy households) would have to change its consumption behaviour. This usually means that in the concentrated case, wealth grows on higher levels than consumption does.
- Timing: time lags of consumption vary from an immediate response to wealth changes to long lags, e.g. bequeathing heirs. Other timing examples are that retirement funds are usually not touched as easily as other funds, or that taxing influences inheritance and consumption decisions.

These factors are in turn influenced by the financial system. In EMU countries, bank-based financial systems seem to prevail (Ludwig and Sløk, 2002, p. 8 et seqq.). Bank-based systems often have smaller stock markets, and payment in stock options is less prevalent. This proceeding leads to a smaller proportion of financial wealth in the total wealth portfolio. One may note, however, that the importance of shares and financial wealth grew in recent years for EMU countries as well, motivated among other aspects by a growing income (wealthier people tend to invest a higher amount in stocks compared to less wealthy people) (Slacalek, 2006, p. 6).

Other than the already mentioned, empirical literature also shows that wealth indeed has a substantial effect on consumption, though this effect seems to apply rather in the long run than in the short run. The long run effect is underlined by a line of research that concentrates on the consumption-wealth linkage in the event of shocks. The influence of shocks and other changes in wealth on consumption seems to be rather small in the short run. For example, monetary policy shocks have minor or almost no impact – depending on the chosen model – on consumption (Ludvigson, Steindel, and Lettau, 2002). A closer look at the nature of shocks reveals that transitory shocks usually have impact on wealth itself, and that only permanent shocks (more often affecting housing wealth than financial wealth) have impact on consumption (Lettau and Ludvigson, 2004; Kishor, 2007).

These results are opposed by Slacalek (2006). His results suggest that the housing wealth effect is bigger than the one out of financial wealth only in the UK and in the US; for EMU countries, a slightly larger effect of financial wealth

32
could be found. His results are confirmed by Sousa (2009) who finds out that housing wealth has almost no influence in the euro area and does not turn out to be significant.

The conclusion that stock market wealth clearly was a more and more important force for consumption in recent years (for bank-based systems in Europe) is reached by Ludwig and Slok (2002) as well. It is important to see that their results imply that elasticity of consumption (especially the long term elasticity) out of stock market wealth is estimated to be much higher – almost twice as large in market based financial systems compared to bank based systems. A much higher sensitivity towards stock market prices with regard to consumption is expected in these countries. All of the core European countries like Belgium, Germany, France, Italy, and Spain are considered as banking-based systems with the exception of the Netherlands (Ludwig and Slok, 2002, p. 9). For Germany, Hamburg, Hoffmann, and Keller (2008) still find a small impact of changes in asset prices on consumption for the years 1980 to 2003. They ascribe their findings to the reluctant attitude of Germans towards stock ownership.

However, most authors find positive long-term marginal propensities of private consumption out of financial wealth. Examples for a positive relationship in single countries are Italy (Bassanetti and Zollino, 2008) or Portugal (De Castro, 2007). For a more detailed overview on single countries, see a European Central Bank publication (Eurosystem Household Finance and Consumption Network, 2009). Very recently Sousa (2009) analysed the marginal propensity to consume in the whole euro area. His contribution uses data from 1980 till the end of 2007 for the aggregate euro area. In contrast to other studies, the author uses complete consumption and does not distinguish between consumption in non-durables and durables. The reasons are convincing (Dreger and Reimers, 2006, p. 10): total consumption should be considered when the reaction of consumption towards wealth changes is considered because households may switch expenditure between these two groups, and changes in wealth might lead to postponing durable investment. Still, an effect on GDP can be observed no matter how consumption is divided. The development of shares and mutual shares in portfolios stresses the expressed statement above, that stock market assets become more and more important. Their proportion in the total financial wealth portfolio rose from 15.8 % in the early 1980s to 29.7 % in the period from 2005 till 2007.

Another reason for the (in some cases) smaller financial wealth effect compared to housing effect given in the literature, is its higher volatility (Bostic, Gabriel, and Painter, 2009). This result, however, is opposed by the trend towards international diversification and the IAPM with its high degree of risk diversification leading to smoother returns.
Put together, a growingly higher influence of financial wealth on consumption can be expected, especially when considering the still growing amount of private financial wealth. There is no doubt, however, that poorer and richer households (and probably in its aggregate: poorer and richer countries) show different behaviour: richer households usually have a greater participation in stock market wealth and drive aggregate measurements (Eurosystem Household Finance and Consumption Network, 2009, p. 16).

What are the dimensions of the consumption-wealth effect? Empirical studies propose a propensity to consume out of wealth at ranges from three to four percent when wealth rises by one unit, while consumption out of wealth seems to be a little bit lower in Europe (Slacalek, 2006, p. 3 et seqq.). Positive shocks to housing wealth in the UK are examined by Disney, Henley, and Jevons (2003). They find a marginal propensity to consume for surprising shocks ranging from nine to 14%. Ludwig and Slok (2002, p. 14) report marginal propensities to consume out of stock market wealth of two till five per cent which is confirmed by Dreger and Reimers (2006). Somewhat smaller is the effect for the whole euro area (Sousa, 2009) with 1.4% propensity to consume out of a net financial wealth increase.

In the light of these results, it is considered that the precondition, financial wealth does influence consumption, is fulfilled. This is the foundation in considering hypothesis number one to be true.

Hypothesis 1: The consumption-wealth linkage exists. This means that wealth influences consumption.

A note on one of the implicit preconditions on consumption is in order: in the quantitative part of the dissertation, it is assumed that the propensity to consume is roughly the same in all countries of the sample and is not modelled explicitly. The empirical studies presented above, unfortunately, either report only aggregated results and not results for single countries; or, studies concentrate on countries outside the sample of the dissertation; or, studies come to very different conclusions. Take for example Kishor (2007) who concludes for the US that financial wealth hardly has an impact on consumption, as opposed to Slacalek (2006) who finds out very different reactions in different countries towards changes in financial wealth. As the latter study includes, many countries that are in my sample, as well a graph of Slacalek (2006, p. 1), is presented. It shows the growth rates of consumption opposed to a re-scaled growth rate of wealth for the years 1994 till 2002 (re-scaling is necessary because the slope “can be interpreted as the marginal propensity to consume” (Slacalek, 2006, p. 1). One may note that the wealth definition of his paper includes housing wealth.
Further interpretation is that first, consumption out of financial wealth is positive; and second, that the marginal propensity to consume is different in the countries of the sample dependent on the financial system. Another consideration comes from the different levels of wealth; probably the propensity to consume is higher in poorer countries. The countries above the regression line are those that consume more out of wealth and often correspond to market-based systems. For the dissertation, this means that although empirical studies bring very different results with regard to the propensity to consume, the financial system at least needs to be considered in the qualitative analysis of the results.

**Note:** Consumption growth and rescaled wealth growth between 1994Q4 and 2002Q4; wealth growth is rescaled by multiplying with the wealth–consumption ratio of 1994Q4. Slope of the regression line, \( MPC_{W}^{LR} = 0.032 \), t-stat: 2.36, p-value: 0.018.

**Source:** Slacalek, 2007, p. 1
2.3.3 A Side Note on Financial Systems and Monetary Policy Transmission

Several times, the financial systems of countries and the respective role of financial wealth were mentioned. In the section before, focus was put on the effect of stock market wealth on consumption. There are more aspects of this topic worth mentioning. If the financial structure has an influence on consumption, how is it defined? Do different financial structures mean a different impact of monetary policy? Both questions are discussed ambiguously in the literature.

Basically, in a bank-based system, banks have the role of an intermediate institution for companies to obtain loans; in market-based systems, companies directly get money from the capital market. An advantage of the first system is the cheaper control of companies (only one intermediary controls a company instead of several stock holders); advocates of the latter system stress the role of transparency (seen from the lender’s side) in the market.2 There are several definitions to judge whether a financial system can be described as a bank-based or a market-based system. Attributes that are often used to classify economies are the size of the stock market, dispersion of stock market wealth over the population, issue of stock options for employees, a comparison of stock market activity versus bank activity, and the efficiency of the system measured by liquidity and cost (Levine, 2002; Ludwig and Sløk, 2002). The different criteria are used with different weights and different ways of measurement. Yet, the results are that most of the major euro area countries are banking based economies with the exception of the Netherlands. Sweden and Denmark are considered as market based systems as well. For the Eastern European countries, a classification is harder to get because for this world region, there are often only studies on single countries. An exception is the one of Elbourne and de Haan (2006) who lists all accession countries to the EMU although the authors do not definitely categorize them into the two categories. Still, the characteristics of these countries are marked. In the context of the dissertation, the activity of banks and the accession to stock markets are especially important factors. If these two criteria are taken into account, Hungary and Estonia rather turn out to be market-based economies; Bulgaria, Romania and the Slovak Republic are bank based economies.

Why should different financial systems respond diversely on monetary policy? In a bank based system, a change in interest rates leads to changed costs for banks to refinance themselves. These costs are passed through to their customers. Higher interest rates lead – other things equal – to higher costs, less economic activity, less inflation, and the other way round. In a market based system, investors are less dependent on banks, and the interest rate channel is weaker. The

---

2 An analysis of the two opposing systems can be found in Rajan and Zingales (2001).
transmission of interest rate setting on shares runs as follows: shares are valued by their discounted cash-flow. If the interest rate rises, the discount on the cash-flow is higher, and the stock price decreases. If the market capitalization of a company decreases (a company is worth less), finance over capital markets becomes more difficult. In both cases higher interest rates lead to less economic activity though the effect is expected to be lower in market-based economies.

The transmission effect is usually not stable because it depends on several factors (Belke et al., 2002):

- Maturity of loans: The longer the maturity is, the longer it takes for a transmission process to come into effect.
- Competition: If companies have a choice to finance over banks or over stock markets, banks have fewer possibilities to pass through interest rate changes.
- Timing of interest rate changes at the capital markets: Interest rates of the ECB affect short-term interest rates (money market). The changes in interest rates are passed on to the longer-term interest rates (capital markets). In the situation of higher interest rates, private households need to pay more for their long-term loan and adjust consumption; companies calculate with new cash-flows. The faster the long-term interest rates react, the deeper the effect of monetary policy is.
- Structure of financial wealth: In countries in which fixed income strategies prevail in the portfolios of investors, interest rate changes come into effect only if the maturity is short. With a strategy based on variable rates of interests or on shares, a more immediate impact might follow.
- Size of companies (Elbourne and de Haan, 2006): The smaller a company, the more it is dependent on bank finance. Economies with many small companies will tend to follow the banking transmission channel.

Empirical results on the effect of monetary policy in different financial systems are ambiguous. Two studies using data just before the start of the EMU (Mojon, 2000; Arnold and De Vries, 1999) come to the conclusion that before the EMU was established, different reactions towards monetary policy shocks can be found. The authors of both studies expect these differences to diminish once the common monetary policy and single currency comes into effect. The latter study finds its result by the insight that capital market structures are highly dependent on inflation experiences of the past. With common policy, inflation will be the same for all member countries.3 The higher the uncertainty on inflation is, the

3 Looking from a later point of time the expectations concerning inflation similarity could not be fulfilled completely. Inflation rates are still different in the different countries of the Eurozone (Erber and Hagemann, 2010).
lower the maturity in capital markets in the case of non-hedged inflation risks is, and the shorter maturity the higher the effect of monetary policy is. Mojon (2000) deduces common reaction to policy in the future because of the common currency and the assimilation of importance of debt markets for all EMU countries. Unfortunately, there seems to be no current study on the Eurozone that distinguishes between the transmissions of the common monetary policy in the different financial systems. At least for the EMU as a whole, the general effectiveness even in the recent financial crisis is confirmed (Čihák, Harjes, and Stavrev, 2009).

For the Eastern European countries, the different indicators for a financial system (e.g. stock market capitalization, number of banks per capita, etc.) were opposed to the reaction functions of the economy (output and inflation) after a change of monetary policy by Elbourne and de Haan (2006). Although some indicators emerged to be significant (e.g. stock market capitalisation), it could not be excluded that the results were the same if the data was randomly drawn. The authors state that it cannot be concluded that the financial system influences policy transmission.

2.3 The Context of Consumption and Business Cycles

This subsection closes the circle to business cycles: only if private consumption is an important part of business cycles, a contribution to convergence can be expected.

Business cycles are usually measured by GDP. Introductory textbooks about economics describe the usual measurement of the GDP as the sum of consumption, gross investment, government expenditure and net exports in the form of an expenditure equation. In the Eurozone, the private consumption part had a share of well above 55 % in the last years according to Eurostat-data, and is therefore the most important factor for GDP.

Although consumption is usually smoother as output (GDP), it should be a good indicator for output unless the other factors building the GDP, like government expenditures, are not counteractive.

At a first glance empirical data reveals a contradictory picture. It suggests that output in different countries is even more correlated as consumption (Backus, Kehoe, and Kydland, 1992; Pakko, 1998) although theory predicts the opposite. This could lead to the impression that consumption is not a plausible channel for business cycle convergence. However, this finding does not contradict the proposition that an increasing consumption correlation is favourable for an increasing output correlation.
To sum up, the second chapter identifies optimal currency area criteria as the main reason why converged business cycles are an object worth studying in the environment of the EMU. Among the criteria, the importance of financial market integration is stressed because of its relationship with portfolio investment. Further, the main results of the literature concerning the consumption-wealth linkage are embraced with the result that, in theory and according to empirical studies, financial wealth has an influence on consumption. These findings are emphasized by the development of growingly integrated financial markets in the EMU and rising private financial wealth. Combining the insights, this leads to the conclusion that portfolio decisions of private households impact consumption and probably influence business cycles via consumption as well.

3. Portfolio Theory

3.1 Motivation

So far, the advantages of following the insights of portfolio theory have not been questioned. The third chapter builds the fundament for the explanation of private portfolio composition by outlining the basics of modern portfolio theory within the concept of the IAPM and the home bias phenomenon. This issue of similar portfolio is theoretically founded in the next sections. It starts with the basics of portfolio theory and the CAPM, followed by its enhancement, the IAPM. The goal of these sections is to provide the necessary basics on portfolio theory and to justify the plausibility of the IAPM as a starting point for the empirical work of the dissertation. Empirics are conducted in Chapter C, which analyses the transmission and link between similar portfolios over return and consumption to business cycle convergence. Chapter three starts with an assertion as to why portfolio theory and the phenomenon of home bias play a significant role in explaining the importance of private investment for business cycle convergence.

The last chapter concludes that financial investment has an implication on consumption and with that on business cycles. Which impact could portfolios have on business cycle convergence? As discussed above, the important features are factor mobility and a common reaction to shocks with the result that consumption, as a major proportion of a business cycle, reacts similarly. If consumption structures in the Eurozone are similar, it is likely that business cycles have a similar development as well. This intuitively leads to the conclusion that the same should be true if the factors leading to consumption similarity are converging. Thus, a similar development of financial returns should lead – other things equal – to more similar business cycles. However, the question as to whether or not the
similarity of portfolio returns contributes to consumption convergence deserves a second look. Preconditions for a consumption convergence via returns are:

First, in the past differences in returns in different investments and different country indices could be observed. If the same returns prevailed already in the past, no effect out of return convergences can have influence in the future.

Second, home bias is pronounced and resulted in the past in portfolio strategies that again resulted in different returns out of financial investment. Otherwise, home bias and portfolio strategies would not be an interesting subject to study.

Put these two points together, it is assumed that investors composed portfolios in a way that returns were different, and that these returns led to different consumption. A reason for this observation could be that income out of financial wealth was an income source only available for a certain part of countries. These differences diminish because the return structures become more similar.

One may note that for a convergence, it is not necessary that poorer countries become richer; convergence only says that consumption develops in the same direction and does not say anything about the consumption gap or level. Of course, other sources of consumption – especially earned income – should not move in opposite direction and offset the effect of financial income. These aspects will be considered in the empirical part of the paper.

This leads to the question: when are financial returns similar? Indeed, this should be a consequence if private investment is similar in the sense of return-structures. In a financial context, return can never be considered without risk since both things are closely related to each other. Especially in short investment horizons, risk is not mirrored in the expected return, and instead rather reduces expected return. As the certainty of returns should affect investment as well as consumption decisions, risk should be considered. Put together, similar risk-return-structures of portfolios support similar financial returns. Financial returns again become more similar if the portfolios themselves are similar.

However, how probable is it that portfolios are similar? To answer this question, portfolio theory provides an answer with the International Capital Asset Pricing Model by Solnik (1974a), which is based on the Capital Asset Pricing Model developed independently from each other by Sharpe (1964), Lintner (1965) and Mossin (1966). The concept of IAPM suggests that the best risk-return-ratio can be achieved by investing internationally, depending on relative weights of countries; hence, it would be rational for investors to follow the IAPM as will be shown below. If all investors would follow the model, the portfolios in the EMU should look the same with regard to country distribution in portfolios and, for this reason, probably risk-return structures. The deviation from the IAPM is discussed as the home bias phenomenon in the literature.
Similar portfolios of private investors indeed have at least one positive implication for business cycle convergence: if investors hold similar portfolios, at least consumption out of these portfolios should be similar (assumed that the consumption-wealth linkage holds) with the convergence of cycles as a consequence.

One might argue that there could be a second positive transmission channel of the IAPM. The second implication is that amplitudes of consumption cycles might become smaller when portfolios are diversified internationally (Sørensen et al., 2007) and therefore could lead to more similar cycles (Duval, Elmeskov, and Vogel, 2007). However, it depends on the definition of convergence if smaller amplitudes automatically lead to better synchronisation of business cycles and would need further research. Holding claims on output on other countries (e.g. through portfolios) is discussed in the literature under the name of international risk sharing. The basic idea behind risk sharing is that the risk of changes in (national) outputs are diversified internationally by holding claims on outputs on other countries as well. The IAPM follows similar ideas as international risk sharing and could be interpreted as a special form of international risk sharing. However, while risk sharing is mainly motivated by income and consumption smoothing, the IAPM has portfolio-optimization in mind. Both concepts lead into the same direction, but have different goals. As the impact of smaller amplitudes on cycles needs more research to be identified clearly, the dissertation will concentrate on the transmission channel of similar portfolios, keeping in mind that a cycle convergence might be caused partly by smaller cycles as well.

Put together, similar portfolios which follow the IAPM are a rational scenario for private investors. Investment, according to this, would lead to a convergence of European business cycles.

3.2 Basics of Modern Portfolio Theory

3.2.1 Core Elements of Portfolio Theory

Each investor is opposed to a great number of investment opportunities for a portfolio. A rational investor is interested in the return of the chosen assets and how safe return is. Therefore, return and risk are the input factors for optimizing a portfolio.4

Return is the sum of price changes, and payments for interest or dividends on stocks and bonds. As return is often not fixed in advance, the expected value of return for an asset is used as an input factor for portfolio decisions. The expected

4 Sections 3.2 to 3.2.3, if not otherwise noted, are derived by Elton, Gruber, Brown, and Goetzmann (2007), but could have been derived by other textbooks such as Spremann (2006) as well.
value is the average outcome, calculated by the sum of the products of the return in different situations and the probability of incidence in a certain situation.

\[
\bar{R}_i = \sum_{j=1}^{M} P_j R_{ij}
\]

with \( \bar{R}_i \) as the expected return of the \( i \)-th asset (expected values are denoted with a bar)

\( M \) as the total number of situations \( j \)

\( P_j \) as the probability of the \( j \)-th return on asset \( i \).

As expected return is an average, the dispersion of the different outcomes might be large. An investor might be confronted with very different outcomes and might want to know the real outcome variation from the expected value. This is measured by the variance of an asset, denoted by \( \sigma^2 \).

The variance of an asset is calculated by squaring the difference between the return in a certain situation \( j \) and the expected return (to avoid cancelling out positive and negative deviations to 0) multiplied by \( P_j \). This quotient is taken for each situation \( j \) and is summed up.

\[
\sigma^2 = \sum_{j=1}^{M} \left( P_j (R_{ij} - \bar{R}_i)^2 \right)
\]

The root of the variance is the standard deviation, the dispersion around the expected return and the risk measurement for each asset \( i \).

An investor is not only interested in the characteristics of single assets, but also in the combination of assets that are parts of the portfolio.

Return of a portfolio in situation \( j \) is the weighed return:

\[
R_{pj} = \sum_{i=1}^{N} (X_i R_{ij})
\]

with \( N \) as the number of assets in a portfolio

\( X_i \) as the proportion of asset \( i \) in the portfolio (proportions add to 1)

Analogously, the average portfolio return \( \bar{R}_p \) is the weighted average of mean returns of the assets.
Portfolio risk can vary distinctly from the average risk of its components, the single assets. The reason for this observation is that different assets might react differently in different market situations, i.e. their correlation is not 1. The correlation coefficient takes values from -1 to 1. A correlation of 1 means that assets co-move perfectly, whereas a coefficient of -1 means that assets move in exactly the different direction. In reality, the correlation coefficient normally takes an intermediate value above 0.

A portfolio that exists of two assets with equal proportions and perfectly opposing correlation coefficients ensures that positive outcomes above the expected return and losses cancel out. The risk of such a portfolio would be 0. Portfolio risk therefore depends on the correlation between assets – how much they move together in the market. Although the example is an extreme situation, it shows that variance can be reduced by combining assets.

How is the variance of a portfolio calculated? As mentioned, the co-movements of assets play an important role. As demonstrated in the single asset case, the difference between the return of a portfolio and the average return are taken and squared.

$$\sigma_p^2 = E(R_p - \bar{R}_p)^2$$

with $E$ indicating expected values

Utilizing the formulas for $R_p$ (F3) and $\bar{R}_p$ (F4) in the portfolio, variance formula (F5) and rearranging yields:

$$\sigma_p^2 = \sum_{j=1}^{N} X_j^2 \sigma^2_j + \sum_{j=1}^{N} \sum_{k=j+1}^{N} (X_j X_k \sigma_{jk})$$

with $k$ denoting security $k$

$\sigma_{jk}$ is the covariance of securities $j$ and $k$; or: $(R_j - \bar{R}_j)(R_k - \bar{R}_k)$ (product of the deviations of the return from security $i$ from its mean and the deviation from security $k$ from its mean)

The correlation of two assets explain why efficient portfolios usually have a lower risk than single assets (the only exception is that all assets in the portfolio have a correlation of 1). The first scholar who gained that insight is the founder of the portfolio theory, Harry M. Markowitz (1959, based on his initial work
from 1952). The basic idea is that in a well-diversified portfolio, the correlation between assets can be chosen in a way that risk is minimized by using the correlation characteristics of assets. In a very well-diversified portfolio, the individual risk of an asset, the so-called unsystematic risk, can be completely eliminated. On the other hand, the risk that lies behind all portfolios – the market risk – cannot be diversified away as this is the common factor that accounts for all assets in the market. It is the so called systematic risk (Spremann, 2006, p. 314 et seqq.). This consideration is used in the assumptions of the single index model (Section 3.2.3) as well.

3.2.2 The Efficient Frontier

Usually, an investor prefers more return to less, and in the literature, it is usually assumed that investors are risk averse. If there would be no risk aversion, investors would put all their money into the single asset that offers the highest return. Portfolios that lay on the so-called efficient frontier are those that are preferred according to their characteristics of risk and return. The shape of this line demonstrates why an investor would only choose a portfolio on the frontier.

Graph 3: The Efficient Frontier

The higher the return an investor wants to achieve, the more risk she or he needs to take. All portfolios that are under the curve are characterized by more risk for the same return, or less return for the same risk. Therefore, a risk adverse investor would always prefer a portfolio on the efficient frontier. The more risk adverse, the closer to the origin the chosen portfolio is.

The portfolio with least risk is called the minimum variance portfolio (MV); the portfolio with the biggest achievable return is called the maximum return portfolio (MR). The efficient frontier is a connection of these two points that necessarily needs to be concave (concave includes a straight line). This approach is appropriate because the combination of assets can never be more risky than the sum of the risk of the assets in the portfolio (Elton et al., 2007, p. 81; Steiner and Bruns, 2007, p. 11).

From the previous sections to this section, the assumption that only risky assets are part of the portfolio was made. Tobin (1958) added the possibility of riskless lending and borrowing as components of the portfolio. In reality, completely riskless assets - this means assets with a variance of 0 - do not exist. Though government bonds in EMU-countries are considered safe and exhibit low variances, these bonds may still vary in their return. Riskless borrowing would mean that investors can short-sell a riskless asset at the riskless rate $R_F$; riskless lending means buying assets at the riskless rate.
The higher the return an investor wants to achieve, the more risk she or he needs to take. All portfolios that are under the curve are characterized by more risk for the same return, or less return for the same risk. Therefore, a risk adverse investor would always prefer a portfolio on the efficient frontier. The more risk adverse, the closer to the origin the chosen portfolio is.

The portfolio with least risk is called the minimum variance portfolio (MV); the portfolio with the biggest achievable return is called the maximum return portfolio (MR). The efficient frontier is a connection of these two points that necessarily needs to be concave (concave includes a straight line). This approach is appropriate because the combination of assets can never be more risky than the sum of the risk of the assets in the portfolio (Elton et al., 2007, p. 81; Steiner and Bruns, 2007, p. 11).

From the previous sections to this section, the assumption that only risky assets are part of the portfolio was made. Tobin (1958) added the possibility of riskless lending and borrowing as components of the portfolio. In reality, completely riskless assets – this means assets with a variance of 0 – do not exist. Though government bonds in EMU-countries are considered safe and exhibit low variances, these bonds may still vary in their return.

Riskless borrowing would mean that investors can short-sell\(^5\) a riskless asset at the riskless rate \(R_F\); riskless lending means buying assets at the riskless rate.

The investor chooses to invest a certain proportion \(X\) in combination with an efficient portfolio A and invests \((1-X)\) into the riskless asset.

The expected return of this portfolio-combination is

\[
\bar{R}_C = (1-X)R_F + X\bar{R}_A
\]

Considering that \(\sigma_{ib} = \rho_{ib}\sigma_i\sigma_b\) with \(\rho_{ib}\) being the correlation coefficient and applying the two-asset case to equation F6 brings

\[
\sigma_C^2 = \sum_{j=1}^{N} X_j^2 \sigma_j^2 + \sum_{j=1}^{N} \sum_{k=j+1}^{N} (X_j X_k \sigma_{jk})
\]

\[
\sigma_C^2 = (1-X)^2 \sigma_A^2 + X^2 \sigma_F^2 + 2X(1-X)\sigma_A\sigma_F \rho_{FA}
\]

The riskless rate has no variance, that means \(\sigma_F = 0\). Considering this and taking the root, the equation reduces to

---

\(^5\) Short-selling means that the seller does not own the asset the moment she or he sells.
\[ \sigma_c = X \sigma_A \]

This means that the proportion \( X \) that is invested in portfolio A should be

\[ X = \frac{\sigma_c}{\sigma_A} \]

Replacing this expression for \( X \) in the equation for the expected return (F7), the portfolio return can be expressed by a line which represents the efficient frontier:

\[ \overline{R}_c = R_p + \left( \frac{\overline{R}_A - R_p}{\sigma_A} \right) \sigma_c \]

Graph 4: The Efficient Frontier – No Borrowing Allowed

All portfolios to the left of A mean lending (buying) at the riskless rate; all portfolios to the right mean borrowing (short-selling) at the riskless rate.

An investor could theoretically choose portfolio B on the efficient frontier with a combination of the riskless asset. As all combinations on the line offer either more return for given risk or less risk for a given return, the line must be the efficient frontier and A must be the optimal portfolio. No other combinations of portfolios with the riskless asset can provide a more favourable risk-return ratio.

As riskless borrowing is usually not possible for private investors, the efficient frontier needs to be adapted. The part to the right of portfolio A is therefore still the original efficient frontier.

3.2.3 The Single Index Model

Calculating efficient portfolios demands several inputs. Especially the number of correlations between each possible aspirant, investment for a portfolio needs to be calculated. If for example only 100 assets are on a short-list for possible investments, 4,950 correlations need to be calculated. In addition to this issue, the expected return for each asset and the variance need to be computed, followed by the optimisation procedure for the portfolio (calculating the efficient portfolio).

Return and variance of an asset are usually factors that are more easily available for investors. Correlations between the enormous number of available titles in the world, or even...
efficient frontier and A must be the optimal portfolio. No other combinations of portfolios with the riskless asset can provide a more favourable risk-return ratio.

As riskless borrowing is usually not possible for private investors, the efficient frontier needs to be adapted. The part to the right of portfolio A is therefore still the original efficient frontier.

3.2.3 The Single Index Model

Calculating efficient portfolios demands several inputs. Especially the number of correlations between each possible aspirant, investment for a portfolio needs to be calculated. If for example only 100 assets are on a short-list for possible investments, 4,950 correlations need to be calculated. In addition to this issue, the expected return for each asset and the variance need to be computed, followed by the optimisation procedure for the portfolio (calculating the efficient portfolio).

Return and variance of an asset are usually factors that are more easily available for investors. Correlations between the enormous number of available titles in the world, or even on country level need, to be separately calculated and are probably hardly tangible for investors.

To simplify the calculation and to forecast correlation structures, the insight is used that there is a common factor to all traded assets that affects their development. Usually, if the market goes up, most share prices go up as well, and the other way round. Often, changes in the market are considered in the single index model as the shared factor. If, for example, a country is considered as the market, economic policy could affect all listed titles, or if a monetary union is considered as the market, monetary policy could influence the performance of all assets. If all assets have a common reaction to market changes, this may lead to the conclusion that the correlation of each asset to the market as a whole might be sufficient to represent correlation structures.

For a single asset \(i\), this relation can be expressed as

\[
R_i = a_i + \beta_i R_m
\]

with \(a_i\) being a random variable, representing the part of the return that is not dependent on the market

\(R_m\) being a random variable, representing the return on the market index

\(\beta_i\) indicates the relation between the return on the market and the return on asset \(i\)
A 1% increase (decrease) in the market is reflected by a $\beta_i$ % increase (decrease) of the asset. Thus, the closer $\beta_i$ is to 1, the closer is the co-movement of market and asset.

There are different techniques for estimating $\beta_i$. One example is using the least-square deviation in a regression analysis of historical data (for an overview of estimation techniques see Elton et al., 2007, p. 139 et seqq.).

The term $\alpha_i$ needs to be divided into the expected value $\alpha_i$ and an uncertain part, the random variable $e_i$: $a_i = \alpha_i + e_i$

Considering this, the expected return of an asset $i$ needs to be rewritten to

$$R_i = \alpha_i + \beta_i R_m + e_i$$

The random variable $e_i$ has an expected value of 0 and is considered to be uncorrelated with $R_m$. Formally, this means that the covariance of these variables is 0. If the two variables are not correlated, then equation F12 shows that market return is not dependent on the return of asset $i$.

The most important assumption of the single-index model is that the random variable of asset $i$, $e_i$, is independent from all other random variables $e_j$ from asset $j$. In other words, the change on the market is the only factor why assets co-move.

For a portfolio of assets, the asset-market-relationship is implemented by combining equations F4 and F12, which is the return of the portfolio.

For portfolio risk equation, F8 builds the basis and represents the single-index case if the two following equations, F14 and F15, substitute the according expressions.

The variance of a security is adapted by using equation F13, and considering that $e_i$ has an expected value of 0:

$$\sigma_i^2 = \beta_i^2 \sigma_m^2 + \sigma_{\alpha_i}^2$$  \hspace{1cm}  F14

The covariance between two securities with regard to the single index model by using the definition of $R_i$ above, and the assumption that $e_i$ is zero:

$$\sigma_{ij} = \beta_i \beta_j \sigma_m^2$$  \hspace{1cm}  F15

These two equations demonstrate that the whole portfolio is dependent on the correlations between assets and markets. One may note that the single-market model is a model that functions due to the made assumptions. The single index model is the fundament for the Capital Asset Pricing Model.
3.3 Capital Asset Pricing Model

3.3.2 The Standard Model

Three authors – Sharpe (1964), Lintner (1965) and Mossin (1966) – derived the standard Capital Asset Pricing Model (CAPM) autonomously from each other. Even as its age seems to be antiquated compared to the rapid developments on financial markets, the model is still widely used and constantly adapted.

The CAPM is an equilibrium model. The basic idea of equilibrium models is that if the single investor behaves “optimal” (behaves as predicted by models), then it should be possible to describe how all investors behave and what impact this behaviour has on the market.

The assumptions of the CAPM are quite restrictive. However, as can be seen later, even under these assumptions, the CAPM describes stock market reality quite well.

– There are no transaction costs and no taxes that distort portfolio choice of an investor.
– All assets of an investor are marketable and are divisible.
– Perfect competition prevails, that is, no investor influences prices by his or her actions on the market.
– The choice of portfolio composition follows the procedures described above, that is, on the risk-return-characteristics of a portfolio.
– All investors have homogenous expectations on portfolio return, variance and correlation between assets, and they consider the same time-period.
– Short sales and riskless borrowing and lending are allowed.

The starting point for the CAPM is the efficient frontier and the fact that all portfolios on it are efficient. In Section 3.1.2, it was shown that all investors hold combinations of a riskless asset, and that the portfolio is farthest out on the efficient frontier. The conclusion is drawn because no other portfolio offers more return for given risk or less risk for a given return. The combination with the riskless asset allows for all degrees of risk aversion of an investor because the more risk averse an investor is, the more investment into the riskless asset is conducted (see e.g. Lapp, 2001, p. 18 or Tesar and Werner, 1995, p. 475).

Now, if all investors have homogenous expectations as assumed in the CAPM, all investors hold the optimal portfolio (denoted by M in Graph 5). In market equilibrium, all assets are sold and bought, the consequence is that necessarily all investors hold the market portfolio. The market portfolio is the portfolio that contains all risky assets of the market. The proportion of an asset in an individual portfolio corresponds to the proportion of a respective asset of the total market value.
Graph 5: The Market Portfolio

Source: Elton et al., 2007, p. 287

The line starting in $R_F$ and going through $M$ is called the capital market line, and it represents the efficient frontier. It can be described by equation F11, while the $A$ is replaced by an $M$ to indicate that it is the market portfolio. $\sigma$ measures the risk of the whole portfolio.

$$\bar{R} = R_F + \left( \frac{R_M - R_F}{\sigma_M} \right) \sigma$$  \[F16\]

The equation breaks down the determinants of portfolio return into a price of liquidity (the riskless rate) plus the price for taking over market risk (the term in brackets is the reward-to-risk ratio of the market portfolio) multiplied by the amount of risk in the whole portfolio. Thus, there is a proportional relation between the risk of a single title and the market risk, which is the main conclusion of the CAPM (Spremann, 2006, p. 302).

This equation only applies to efficient portfolios, but does not explain return on any other portfolio. To find out about portfolio risk on a more general basis, the considerations of the single index model are included.
As argued above, for a very well-diversified portfolio, the market risk as the systematic risk is the only risk for a portfolio. This risk is represented by $\beta$. The market portfolio that is held by assumption by all investors fulfills the requirement of a well-diversified portfolio. Therefore, only the expected return of a portfolio $\bar{R}$ and its risk $\beta$ play a role in the investment decision. In equilibrium, all portfolios must lie on one line of the expected return-beta-space; otherwise, riskless arbitrage opportunities would exist.

Graph 6: CAPM – The Security Market Line

As the market portfolio has the same development as the market as a whole, its risk must be completely correlated. As a consequence, $\beta$ must be 1, and the return of the market portfolio is $M_R$ (the weighted average of the expected return of each asset in the market).

The equation for the efficient frontier in the CAPM subsequently is

$$\bar{R}_i = R_p + \beta_i (M_R - R_p)$$

Source: Elton et al., 2007, p. 290
The equation shows that $\beta$ is the only reason why returns on securities differ, as $R_F$ and $R_M$ are independent from individual securities. It shows as well that taking over unsystematic risk (that is, the risk of a single security that could be diversified away) brings no extra-return as it does not even appear in the equation. If unsystematic risk can be eliminated totally, there is no reason to pay a risk premium on it. This relation underlines that holding the portfolio that is diversified on the highest level available is a rational consequence for an investor, and this means holding the market portfolio.

It is important to stress that the market portfolio is an efficient portfolio, and that it is rational for investors to hold it because there is no other portfolio with a better risk-return-ratio.

3.3.3 Shortcomings of the Standard CAPM

The CAPM is an intuitively attractive model though it suffers from some shortcomings. Critiques of the standard CAPM basically follow two lines:

The first line pursues the argument that the assumptions are too strict with regard to real investment decisions. The assumptions do not reflect investment reality. The second line states that the results of the CAPM do not reflect reality either.

This section provides a short overview on the arguments against the CAPM; the next sections deals shortly with empirical findings. What are the arguments behind the first line, that the assumptions are too strict and do not reflect investment reality?

The CAPM as an equilibrium model can describe macro returns, but cannot explain individual behaviour (very few investors hold a market portfolio in reality; see Section 3.4.3 on home bias). An explanation might be derived by some of its assumptions.

The most controversial assumptions with regard to private investors are that short sales are allowed, that riskless borrowing is possible, that homogenous expectations prevail, that all assets are tradable, and that there are no transaction costs or personal taxes that affect the investment decision.

All of these assumptions have been dissolved one at a time and led to modified models. It could be shown that basically the main aspects of the model still hold although the enhanced models describe reality better (e.g. investors hold different portfolios due to personal taxes or the slope of the security market line changes if riskless borrowing is not allowed; see Elton et al. (2007, p. 305 et seqq.) or Steiner and Bruns (2007, p. 28).

The modifications just mentioned would lead to more complex models that hardly resemble the original model if all assumptions were relaxed the same time. Therefore, some of the critique on the model is valid.
The second argumentation, that the results of the model do not reflect reality, can be divided in several aspects. The model leads to some results that need further examination.

One implicit assumption in the intuitive approach chosen in Section 3.2.1 is that beta is the real risk measure, but this is not necessarily true. But even when the optimal portfolio is calculated, a CAPM with the same results (beta is the relevant risk measure) can be derived (Elton et al., 2007, p. 293 et seq.). If the market portfolio is correctly calculated, there is no other possibility but that the CAPM needs to hold (Spremann, 2006, p. 309; Roll, 1977, p. 130).

Another argument is that the market portfolio is not necessarily efficient and measured correctly. Efficiency in this case means that expected returns are linearly related to the market and that market betas fully describe the cross-sections of expected returns. The argument against the efficiency of measurement of the market portfolio can be further divided:

First, not all assets are tradable or can be evaluated, e.g. human labour or pension claims. For this reason, the market portfolio cannot contain all assets and empirical testing is not possible (Fama and French, 2004, p. 25; and Roll’s fundamental critique (1977, p. 130).

Second, if the chosen market portfolio is not the “real” one, it is probably not diversified perfectly and therefore contains unsystematic risk. The relation between beta and the market would not be the real risk measure anymore (Roll, 1977, p. 130).

Third, there is no capital market equilibrium in reality.

All of these arguments cannot be offset completely; however, the model should be judged upon how well it fulfils its predictions, or in this case, how well it describes the real happening on capital markets. The standard CAPM is an influential model that has been dominating the financial literature for a longer time, and that is the origin of many adoptions and enhancements to describe capital markets.

3.3.4 Empirical Findings

The CAPM has been tested extensively. Because the CAPM needs to hold if the market portfolio is calculated correctly, the empirical investigations rather test if investors really follow the recommendations of the CAPM. The market portfolio itself is usually not calculated, but instead approximated by market indexes (Spremann, 2006, p. 331).

6 The optimal portfolio is the one that is optimized in its risk-return characteristics without the idea of a common factor, represented here by the market beta.
The main results are listed shortly for reasons of completeness, although the international form of the CAPM is the more relevant for this paper.\textsuperscript{7} Tests that confirmed the CAPM: 

In an early study, Sharpe and Cooper (1972) approved in a simple setting that for a period from 1931 to 1967 on the New York stock exchange, higher betas meant a higher return.

Black, Jensen and Scholes (1972) confirmed in their empirical tests that higher betas are closely correlated to higher returns. The further results are consistent with another form of the CAPM, a two-factor-form of the CAPM. This means that beta is not the only factor that defines risk.

Fama and MacBeth (1973) use a different methodology to test the CAPM in their influential study. They test as to whether the CAPM is really an equilibrium model; that means that deviations from it are only random. Indeed, they found out that the residual $\epsilon_i$ has no influence on return. Additionally, they conclude that the expected relation between beta and return is applicable.

The following studies rejected the CAPM, especially the prediction that risk premiums are only paid for market risks:

Bühler (1995) showed that risk premiums vary under different macroeconomic circumstances. This means that investors expect a risk payment if, for example, times are more unsecure (conditional CAPM). If in these situations the unconditioned CAPM is used, systematic risk seems to be rewarded.

In other studies, the relation between beta and risk premiums did not fulfil expectations either. The so-called size-effect says that assets with small capitalisation often have better returns then expected. This can partly be explained by the issue that the market index does not represent all assets. The same applies to assets with a low growth potential (value-effect) and temporary effects like the known January-effect contradict the return assumptions of the CAPM as well (Fama, 1991; Fama and French, 1992).

Broadly, only the results in the early studies mentioned above confirm the ideas of the CAPM. However altogether, the empirical results are ambiguous. There seems to be evidence that investors do not follow the CAPM no matter how rational the model seems to be. Reasons could either be that investors are not rational, or that the CAPM just does not include all factors for investment decision (Fama and French, 2004, p. 37).

\textsuperscript{7} For an overview of empirical studies see e.g. Fama and French (2004) and the literature therein.
3.4 International Asset Pricing Model and the Home Bias Phenomenon

3.4.2 IAPM

One of the criticisms of the CAPM is that not all assets are included in the market portfolio. This is encountered by the International Asset Pricing Model (IAPM) theoretically and in empirical applications. Although the CAPM is mostly applied to national markets in empirical studies, this does not reflect investment reality. Investors theoretically have access to all tradable assets in the world. Considering these thoughts, Solnik (1974a) derived the IAPM on the basis of the CAPM.

The main difference compared to the CAPM is the explicit incorporation of international capital markets – to be exact, the world market. The market portfolio therefore consists of all assets with a proportion of each country according to its asset-capitalization in the world market (Solnik, 1974a, p. 512). The basic idea is that there is a national systematic risk that can be further reduced by investing internationally. The country markets themselves (the country proportions in the portfolios) are already diversified with regard to unsystematic risk. Analogously to the CAPM, risk premiums in the IAPM are proportional to their international systematic risk. Exchange rate risk is considered to be either hedged or, in the case of bonds, the correlation between exchange rate risk and return is explicitly modelled in Solnik’s model. The logic of this model implies that all investors in the world hold the same (world) market portfolio\(^8\) and a risk free asset.

Implicitly, this model assumes that international markets are not completely correlated; otherwise, a diversification would not reduce risk. This implicitly includes that idiosyncratic shocks are not completely transmitted from country to country. If shocks hit all countries uniformly, diversification gains would not be observable.

Solnik (1974b) provides some empirical evidence that international diversification indeed reduces risk. However, his investigation period comprises the years 1966-1971. Doubts are in order if the increasing integration of international capital markets still provides room for a deeper diversification until today.

Although today markets co-move closer, there is still no perfect correlation (Kim, Moshirian, and Wu, 2005; Brooks and Del Negro, 2004). This should\(^8\)

\(^8\) Solnik (1974a) in his intertemporal model differentiates between a hedged stock market portfolio and a risk free bond portfolio. The bond portfolio is only riskless with regard to its beta, not with regard to exchange rate risk. These two risky assets are summarized in this dissertation to the world market portfolio. The risk free asset is our usual risk free asset with a beta of 0 and no exchange rate risk.
imply that international diversification is still beneficial. The average correlation of stock markets of several big countries amounts to 0.475 for a time period from 1991-2000 (Elton et al., 2007, p. 259), which offers a higher diversification than at national level. Lewis (1999, p. 576) confirms for the G-7 countries that correlations between markets are most often far away from 1; Forbes and Rigobon (2002) find correlation coefficient far lower than 1 in the Asian financial crisis of 1997 (correlation between the Hong Kong stock market and OECD countries). Brooks and Del Negro (2004) conclude that diversification across countries is still an effective strategy although recent literature emphasizes the role of diversification across industries. The authors attribute the growing importance of industry effects to the stock market bubble, especially in the telecommunication branch, and therefore it is supposed to be a temporary phenomenon. However, in Europe a growing industry diversification effect can be observed (Brooks and Del Negro, 2004, p. 670).

The literature findings are not totally clear on the question as to whether or not country effects are more important than industry effects on diversification though a good deal of literature points to the direction that country diversification is the better mean to reduce risk. One reason might be that countries represent partly industries, i.e. that countries specialize as it is expected by the international risk sharing literature. If countries experience a higher financial integration, they can specialize without bearing the income risk; as this kind of risk can be diversified over financial assets of different countries (Kalemli-Ozcan et al., 2005, p. 176). According to this literature, diversification across industries or countries should be a question of time until it loses some of its importance. Other reasons for the benefit of country diversification could be differences in economic or monetary policy.

Whereas diversification seems to be still effective today, an investor might ask whether exchange rate risk might not offset the advantages. Von Nitzsch and Stotz (2006) pursued this question and noticed that return increases by about 1% if an international investment strategy is followed, and exchange rate risk is hedged.9 They found out as well that national capital market size influences the advantages of international diversification (von Nitzsch and Stotz, 2006, p. 113), which can be explained by a broader choice of assets and probably a lower systematic risk.

All these arguments should have the consequence that investors invest internationally. Why investors do not necessarily invest internationally is investigated in the literature as the home bias phenomenon, which is analyzed in the next section.

---

9 Schröder (2003) found a benefit of 3% for European investors.
3.4.3 Home Bias – Empirical Background

In the sections above, the conclusion is drawn that it would be rational for investors to hold assets across countries to diversify risks optimally. Each country should have a weight in a portfolio which corresponds to its weight in the world capital market. The deviation of ideal and actual proportion of an investor’s home country in the portfolio defines the home bias. Various empirical studies display that the home bias is quite pronounced in almost all countries in the world, and that there are few rational explanations for it. Hence, the great deviation from ideal portfolio weights is referred to as the home bias phenomenon.

How is the development of home bias? Is it rather declining or rising? Many studies concentrate on the US-investor, though those considering the EMU-countries come to the same conclusions. A wide range of empirical studies on the home bias phenomenon exist. Especially in recent years; probably due to easier access to data and a growing public attention, the amount of empirical work rose substantially. Table 1 gives an overview on empirical studies that cover different aspects of the issue, though it is by far not a complete overview, but nevertheless focuses on certain aspects important to the dissertation.

One of the first studies addressing home bias empirically is the one by Tesar and Werner (1995). They use national time series data of portfolio holdings derived by accumulated capital flows out of the balance of payments and estimate home bias by opposing foreign investment to domestic market capitalization. Their main findings are that in the five OECD counties, home bias is still substantial, and that diversification of risks is not the dominant motive of portfolio composition but other motives such as geographic distance prevail. Another finding is that variable transaction costs are not the reason for a high bias. The last aspect is concluded because international capital flows and transactions grew though it did not result in higher foreign capital holdings.

French and Poterba (1991) find out that one of the main reasons of home bias is the tendency of investors to overestimate the return of their domestic market. Their study is based on a survey among portfolio managers. Neither institutional barriers such as capital controls nor differences in taxes or direct transaction costs are considered to be plausible reasons. Home bias is defined as the estimated foreign portfolio holding (approximated by capital flows) as opposed to market capitalization though the latter is corrected by inter-corporate equity holdings.
Table 1: Selection of Empirical Studies on Home Bias

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Data base of study (year)</th>
<th>Comprising countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investor Diversification and International Equity Markets (1991)</td>
<td>French, Kenneth R., Poterba, James M.</td>
<td>1990</td>
<td>Canada, Germany, France, Japan, United Kindom, United States</td>
</tr>
<tr>
<td>What Determines the Domestic Bias and Foreign Bias? (2005)</td>
<td>Chan, Kalok, Covrig, Vicentiu Ng, Lilian K.</td>
<td>1999, 2000</td>
<td>Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, United Kindom, United States</td>
</tr>
<tr>
<td>Global Bond Portfolios and EMU (2005)</td>
<td>Lane, Philip R.</td>
<td>1997, 2001</td>
<td>Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain</td>
</tr>
<tr>
<td>Financial Integration, International Portfolio Choice and the European Monetary Union (2006)</td>
<td>De Santis, Roberto, Gérard, Bruno</td>
<td>1997, 2001</td>
<td>Australia, Austria, Belgium, Bermuda, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, United Kindom, United States</td>
</tr>
<tr>
<td>Home Bias and International Risk Sharing: Twin Puzzles Separated at Birth (2007)</td>
<td>Sørensen, Bent E. Wu, Yi-Tsung Zhu, Yu</td>
<td>1993-2003</td>
<td>Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Iceland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, United Kindom, United States</td>
</tr>
<tr>
<td>Is the Home Bias in Equities and Bonds Declining in Europe? (2007)</td>
<td>Bosch, Thijs Schoenmaker, Dirk</td>
<td>1997, 2001, 2004</td>
<td>Austria, Belgium, Denmark, Finland, France, Iceland, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, United Kingdom, United States</td>
</tr>
</tbody>
</table>

Mutual funds data is the base for the analysis of Chan, Covrig, and Ng (2005), which is among the first studies which uses a wider range of countries, including developed and developing countries. Similar to earlier studies, their finding is that more wealth is invested in domestic position, which is surprising because mutual funds are expected to behave more rational as individual investors. The authors identify as determinants of home bias geographic distance and different
languages. Minor but significant determinants are the development status of a foreign country, taxes, and capital controls. The latter effects are a new insight as compared to previous literature, probably because developing countries are included in the study and a different time frame. Their data set of mutual funds is from Thomson Financial Securities and directly considers portfolio holdings in contrast to accumulated capital flows. Adjaouté, Danthine, and Isakov (2005) observe institutional investors as well; with the result that home bias is declining in Europe. They ascribe this development to the establishment of the EMU in the years 1997 till 2001.

Lane (2006) focuses on EMU countries, particularly their bond portfolios, using IMF data of the Coordinated Portfolio Investment Survey (CPIS). In Lane’s study, the possibility of a euro bias – the tendency to overweight EMU-countries in the portfolio – is analyzed and confirmed. This is interpreted as a trend towards financial regionalization. The study confirms as well that trade linkages and geographical proximity are factors contributing to reduce home bias. Exchange rate volatility, on the other hand, shows no significant influence.

According to De Santis and Gérard (2006), the decline in home bias of equity and bonds can be mainly observed in the EMU countries and in a few other countries, but is not necessarily a global trend. Home bias is measured by opposing the actual foreign holdings to optimal foreign holdings. The main reasons for the positive development in the EMU are according to the study rational ones: the common currency and expected diversification benefits. The latter comprises diversification of fundamentals and currency (for countries outside the EMU) and is derived by weekly Datastream and JP Morgan return data, interpreting a decrease in return variance as a diversification benefit. Another reason for the fast decline is that home bias was very pronounced in the years before the study, which means that small amounts of international investment have a greater weight.

Another perspective is taken by Sørensen et al. (2007). The authors investigate the connection between home bias and international risk sharing (consumption smoothing and an equalization of consumption growth rates via international property holdings). They conclude that first of all, home bias declined fast; second, that a lower home bias and higher financial integration lead to higher income and consumption smoothing. Their estimation method is via pooled panel data regressions. The size of risk sharing is substantial: lowering (equity) home bias by 0.1 points means rising income smoothing by 4 % (Sørensen et al., 2007, p. 598) in OECD countries. For bond bias, no significance is deducted. Interestingly, for the pure EU sample within the OECD sample, neither equity nor debt home bias had a significant influence on consumption and income risk sharing. This raises the expectation for my study that portfolio similarity has less influence on the EU as on countries outside the EU.
Newer data confirms the trends already discovered in the mentioned literature, e.g. Bosch and Schoenmaker (2008) approve that home bias in EMU is declining more than outside the EMU and goes hand in hand with a euro bias. They add new explanations for the decline of home bias: significant are basically two effects. The professionalism effect supports the thesis that institutional investors tend to invest more rational. Countries with a higher proportion of mutual funds managers show a lower home bias. The availability effect states that a more developed domestic market induces local investors to invest at home and use the nearby resources.

As mentioned above, various other studies exist, e.g. about the influence of international accounting standards on home bias (Beneish and Yohn, 2008) or address the cost of home bias (Bluethgen, Jansen, Meyer, and Hackethal, 2008), which is discussed more detailed starting from Section 4.6.

3.4.4 Explaining Home Bias

3.4.4.1 Rational Explanations

All empirical work confirms that home bias is declining though its amount is still substantial. The question is why individuals apparently do not hold optimal portfolios and do not hedge their risks across countries. Broadly, the explanations for the existence of home bias can be divided into two groups:

– Home bias is explainable because rational motives not included in the models exist.
– Home bias is explainable because investors do not act rational as it is assumed in the models. The explanation lies rather in psychological areas.

For the first group of arguments, several explanations are given in the literature though no completely satisfying and conclusive answers are given. The main arguments are prepared in a literature review by Lewis (1999, p. 575):

1. International diversification does not protect against all kinds of risk.
2. Home bias is measured incorrectly.
3. Transaction costs are too high.

Explanations in the first group are the existence of non-tradable assets such as labour or pension claims or (with restrictions) housing. These assets are strongly dependent on the development and shock sensitivity of the respective domestic market. Logic would imply that international diversification should even be larger as just the diversification degree suggested by the IAPM. Baxter and Jer- man (1997) pursued this question and highlight that return on human capital
(labour income) is highly correlated to return out of financial capital in their sample of four OECD countries. This implies that a great wealth position is not hedged against risks. Inflation risk is another explanation that is not addressed in the standard IAPM (returns are considered to be the same in all countries, therefore no inflation is modelled). Intuitively, inflation risk hedging by investing mainly at home would make sense if national inflation is negatively correlated with national asset returns. Empirical studies (Cooper and Kaplanis, 1994) do not confirm this connection; therefore, inflation risk does not provide a plausible explanation for home bias.

The second line of arguments assumes that home bias is not measured correctly because of shortcomings in the statistical estimation process, and because some information is not considered in the IAPM. The fist line analyzes the possibility that there are no gains from international diversification because markets co-move closely. If markets would be perfectly correlated, no adjustment of income out of capital could take place. Gorman and Jorgensen (2002) use different statistical approaches and argue that due to the difficulties in estimating the optimal portfolio correctly, a completely domestic portfolio is not significantly different from the optimal one. The issue of a correct calculation of the optimal portfolio arises from the fact that that return and variance are often calculated by historical data and estimation procedures. Historical data does not contain any information about future events. Standard errors are often too high for a good forecast of returns; therefore, uncertainty induces the investor to invest at home. Von Nitzsch and Stotz (2006), supported in this view by Baele, Pungulescu, and Ter Horst (2007), argue that although the market portfolio might not be efficient, the alternative measure of home bias, i.e. to calculate optimal portfolios, would not necessarily offer a more accurate measure because of the just mentioned intrinsic estimation issues.

Other literature investigates whether international diversification is already incorporated in assets of multinational companies which would mean that partly domestic assets need to be calculated as international assets. This would imply that assets of multinational companies do not co-move with their national stock market. Empirically weak evidence for just two countries in the sample analyzed by Rowland and Tesar (2004) could be found to support this argument.

Lapp (2001) finds out for Germany that barriers to a free choice of the portfolio composition from sources of workers’ asset formation funds are a plausible reason for home bias. Out of this source, international portfolios are less supported as national portfolios because access to international markets is denied for the workforce within this funded measurement. In several European countries, privileges for domestic bonds or shares are provided, e.g. tax shelter for interest or dividend payments or the issue of shares for employees (Lapp, 2001, p. 143). For
the countries of the sample that will be used for the econometric part of the dissertation, she lists Belgium, France, Italy, the Netherlands, Austria, Denmark and Sweden. The author explains home bias by the incentive of the extra return investors procured from the government if they invest at home. The investments at home are not restricted to bonds or shares, but may include, among others, saving through a building association. Disadvantages of home bias are compensated by the government. However, the author concludes that the dimension of home bias cannot be explained by the incentives of the government.

A third line analyses the influence of transaction costs, including information costs, international taxes, exchange rate volatility, and trade barriers. Transaction costs are analyzed by Tesar and Werner (1995). As already mentioned above, they conclude that because of the high amount of international capital flows, transaction costs are no explanation for home bias because foreign transactions tend to be much higher as domestic transactions. Fidora, Fratzscher, and Thimann (2007) find some evidence that exchange rate volatility plays a role in investing at home, especially when exchange rate risk builds the greater part of total risk. Still, even when exchange rate risk occurs, the return of investing internationally would be greater as mentioned above.

3.4.4.2 Behavioural Finance

The second broad line to explain home bias is known in the literature under the term of “behavioural finance” or, in a more general context, “behavioural economics”. This line does not follow the assumption that investors solve situations strictly like economic theory would do – in other words, investors do not act completely rational. Deviations from the “ideal” are sought to be explained by psychological, sociological and behavioural aspects. Herding – like it was seen in bank runs in the past -, contagion effects, risk aversion or risk affection, self-control and patterns people are used to, are keywords for the financial world.

The individual behavioural background to these phenomena can be described with the following attributes: overconfidence, financial cognitive dissonance, the theory of regret, and prospect theory (Ricciardi and Simon, 2000). Overconfidence means that investors (or in general human beings) tend to be too optimistic with regard to their own skills, in this case about the judgement on the success of assets in their own portfolio. Overconfidence leads to a higher turnover in the portfolio which often leads to diminished returns (Barberis and Thaler, 2003, p. 1104). The overconfidence effect is strengthened, or sometimes triggered, by a financial cognitive dissonance. This means that bad experiences like earlier losses are suppressed, and humans do not learn from mistakes. An explanation offers the handling of inner conflicts between past experiences and new informa-
tion which the investor tries to settle. Settlement can either result in neglecting past experience or justifying the investment decision by rational explanations. The theory of regret is a main point to explain herding behaviour. People are reluctant to sell their low performing stock because they might find (when buying new stock) out that the other stock is not performing any better. They would have to admit a wrong investment and have at the same time the emotion that the exchange towards an unknown investment might not be profitable. If many investors change their investment and buy something new recently, the emotion of changing the strategy is not that bad because there is the feeling that a disappointment would be shared by many others. Another explanation is informational asymmetry: the behaviour of others is observed and interpreted as an informational advance of the other market participant (Banerjee, 1992). The fourth aspect, prospect theory, deals with weighting different outcomes in a way that is not rational, e.g. that gaining stocks are sold but less performing stocks are held. These decision weights often arise when a loss of money might occur (Ricciardi and Simon, 2000).

It would go beyond the scope of the dissertation to go further into the theoretical backgrounds; still, it is important to understand the (subliminal) motives of investors to find solution strategies to overcome the irrationality.

Some empirical studies address this issue although it is not necessarily labelled behavioural economics. As seen in Section 3.4.4, it was already suggested in some literature that geographical proximity or a common language are factors for an investment decision: a known environment seems to support foreign investment.

A very comprehensive survey on existing studies on behavioural finance is given by Barberis and Thaler (2003). In their essay, investor behaviour makes up only a fraction of the influence of psychologically motivated behaviour in the field of finance. Two examples are the puzzles as to why closed-end funds are not traded at a price that corresponds to their net asset value, or why companies pay dividends although the shareholder would be better off if shares would be repurchased because of tax payments. The authors stress that it is very important to understand investment behaviour. Their arguments are that there is a worldwide trend for individualized retirement plans including stock market assets, and because of the fact that trading becomes cheaper and is accessible for a broader mass (Barberis and Thaler, 2003, p. 1101). One explanation for home bias could be that investors seem to prefer a naive diversification, meaning to allocate capital evenly over different possibilities. This means on the one hand, that weights like the IAPM demands are not preferred; and on the other hand, that choice is dependent on the investment possibilities the investor perceives.

Fernandes, Peña, and Tabak (2009) put different behavioural explanations in a model to explain portfolio choice. The different elements of prospect theory are incorporated in a utility function: mental accounting (gains and losses are consid-
pered, not final wealth), loss aversion, asymmetric risk preference (individuals seem to be less risk averse after a loss and more risk averse after a gain) and probability weighting function (underestimation of high probabilities and overestimation of low probabilities). The goal is to find out about the cost in return due to non-rational behaviour compared to a rational choice. In the modelled world, only two assets (riskless and risky) and two periods exist. In the first period, two human biases – at least out of prospect theory – seem to cancel out (Fernandes et al., 2009, p. 15): loss aversion versus asymmetric risk preference. Probability weighting has ambiguous effects, e.g. a low probability of loss might be overestimated and stock is sold instead of kept. The overall picture gives the impression that biases are channelled in a situation in which risk premia (return of the risky asset) are high and induce loss adverse investors to turn towards the risky assets. In a situation of low risk premia, a higher inclination towards the risk-free asset is observed which would match the optimal allocation. In the second period, experiences from the first period are taken into account and asymmetric risk preference as well as return expectations induce different portfolio choices and return levels. The antagonistic part is the experience with gains and losses: a small loss in the first period would either lead to higher risk taking to compensate the losses; on the other hand, with a high loss, the loss aversion effect might dominate. In a second part, the authors test empirically if a behavioural model which includes return estimation risks outperforms the Markowitz model. They conclude that if a risk-return measurement (the Sharpe ratio) is considered, the behavioural models outperform the standard model, while a pure return consideration prefers the traditional model. At first sight, this sounds like a counter position to the usage of clear investment rules like the IAPM. However, first of all, the authors only took the prospect theory into account, not the other behavioural aspects mentioned above; second, they neglected the facts that their model cannot explain current portfolio compositions. If their model would apply, the real portfolios would not show lower performance and higher risk as the optimal portfolio does.

Graham, Harvey, and Huang (2009) show by using survey data that home bias can partly be explained by the “felt competence” of investors. If they feel that they are competent in trading and the better they know a market, the higher the probability of investment in this market is. This is typically applicable for the domestic market. On the other hand, investors who feel knowledgeable in the general field of finance and investment – typically male, wealthy and well-educated people – trade more often and have a higher foreign proportion in their portfolios. The reason behind this is that this type of investor trusts in his or her own judgement to judge on the international benefits, as described above with the overconfidence effect.

Kilka and Weber (2000) follow a similar line of research. The core thesis of the paper is that asymmetric expectations of domestic vs. foreign investors lead to a
wrong expectation of returns. The authors show for investors from the US and Germany that the higher the felt competence is, the higher the expected return on a market is. This often leads to an overestimation of the returns on the domestic market. The same overconfidence can be observed for financial products that are considered to be more sophisticated and need a higher competence level.

A further proof for the competence thesis comes from the analysis of investment behaviour of immigrants. One should expect that their bias towards their origin country decreases over time with growing competence with the new home market. Foad (2008) extends the thesis by the thought that information on origin countries is spread in the new home countries and induces a lower home bias for countries with a high immigration proportion. This is indeed confirmed for 28 countries with different levels of immigration for averaged data in the time period 2001 till 2004.

Magi (2005) puts up a model that brings behavioural aspects and home bias together. Home bias is explained by the complexity of financial market information and the missing ability of investors to use all information that would be necessary to make use of the benefit of international diversification. Not all information is used and considered for the whole portfolio. In a new investment decision, only the risk of a single foreign position is perceived that might be higher than the domestic one if not the complete portfolio is incorporated in the decision (Magi, 2005, p. 23). There are hints from Italian data that people with higher education tend to be able to exploit information better and have a higher foreign proportion in their portfolios.

3.5 IAPM – A Plausible Starting Point?

Despite the actual behaviour of investors – is the IAPM a plausible benchmark for the measurement of home bias at all? To remind of the facts: it is still rational for an investor to follow the IAPM and diversify internationally. The main aspects that are discussed are listed in the following paragraphs:

The market portfolio is theoretically an efficient portfolio. Although it is not in all cases empirically founded, the alternative to calculate the optimal portfolio has its difficulties as well, especially concerning the use of historical data and the estimation of returns. Besides the estimation mistakes just addressed, optimal portfolios have greater deviations in the course of time. If the IAPM is considered as a long-term investment strategy in contrast to short-term decisions, it is a plausible direction for investors to take (von Nitzsch and Stotz, 2006, p. 107).

Another positive argument is that the Sharpe ratio is maximized, that is, the risk-return ratio is optimized if an investor follows the IAPM.
International diversification further reduces portfolio variance by diversifying domestic systematic risk. Even if capital markets are strongly correlated in the future, a diversification gain should still be observable.

Finally, the result of most empirical investigations is that although home bias exists, it is declining. Even if measurement and reasons for home bias still face difficulties, the tendency of a declining home bias is strong and cannot be neglected.

Although some factors like the empirically difficult proof of the market portfolio efficiency speak against the use of the IAPM, the alternatives are not convincing either. In addition to these arguments, one should keep in mind that the IAPM is the standard approach in the literature to calculate home bias, and most authors agree that international diversification would be advantageous for investors (e.g. von Nitzsch and Stotz, 2006; or Rowland and Tesar, 2004). I'll follow that tradition and use the IAPM as the starting point for further investigations. Later on, empirics support the findings in the literature.

Which implications does the choice of the IAPM as a benchmark have? I would like to recall that the goal of this dissertation is to find out about the influence of private portfolio decisions on consumption and on business cycle correlation in the EMU-countries. Thus, the first step was to find a plausible investment strategy that fits all investors in EMU regardless of their risk aversion. This is the IAPM. If all investors follow the IAPM, all portfolios in EMU look the same – the (world) market portfolio. The transmission channels then goes from the same returns out of financial wealth to similar consumption and from there to similar cycles. 10 With the acceptance that the IAPM applies, portfolio decisions can be judged in its light, and it can further be assumed that the choice of countries determines return and risk of a portfolio. The IAPM offers not only the insight that diversification is useful, but assumes as well that country diversification (opposed to industry diversification) is the relevant strategy. That international diversification is still more effective as industry diversification is confirmed by many empirical works as discussed above, especially in the light that more specialisation in countries is expected.

One may note, however, that the home bias is not the relevant measure for portfolios. The empirical work in this dissertation is not dependent on whether the IAPM is true or not although the results of the empirical work can be interpreted in the view of it. The relevant measure here is rather whether portfolios are similar.

This deserves further explanation. Consider a situation where two countries in the real world hold assets reciprocally in equal proportions. This would imply

\[ 10 \text{ Implicitly it is assumed that consumption patterns are similar in different countries.} \]
that their portfolios are completely equal, but they do not follow the IAPM (because in the real world, no two countries make up of 100% of the world portfolio). Their consumption should correlate, and so should their business cycles if financial wealth has a sufficient influence on consumption. A similar portfolio could occur even if international correlation is worthless if investors hold inefficient portfolios or if home bias is measured incorrectly. Still, according to theory, the IAPM is a plausible investment strategy; therefore, the IAPM and the differences from the market portfolio are used as a measure for similarity in the next chapter.

Another indication is appropriate at this place. In the described framework international (consumption) risk sharing, i.e. the amplitude of consumption plays no role. Although consumption smoothing might contribute to business cycle convergence as mentioned above – here, only the similarity of portfolio returns, resulting in similar consumption – are interesting. Ideally, financial returns and consumption show similar developments. If so, it does not matter if the amplitude of the respective factor is large or small.